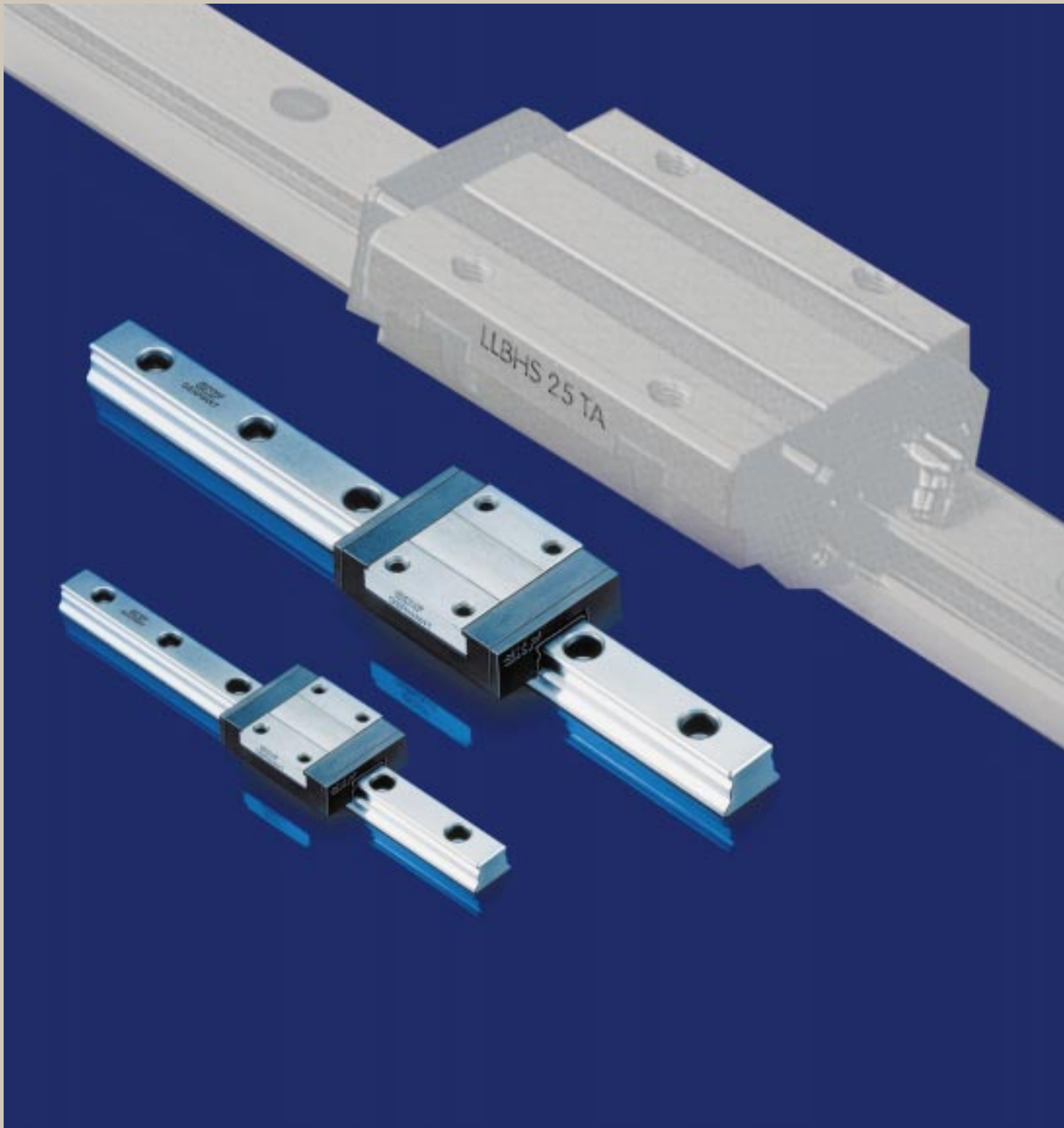


SKF Miniature Profile Rail Guides



The SKF Group

The SKF Group is an international industrial corporation of AB SKF Sweden, founded in 1907, operating in 130 countries. The company has some 45000 employees and more than 80 manufacturing facilities throughout the world.

Its international network is supported up by nearly 20000 distributors and retailers. SKF is the world leader in the rolling bearing business.

Bearings, seals and special steels are SKF's main product areas. In addition, they also manufacture and sell, other industrial precision components and products.

SKF Linear Motion

One of these industrial precision products assortment is manufactured and sold by the SKF Linear Motion Division.

This unit has some 700 employees, 6 manufacturing facilities, 3 product lines. One of the division's strengths is its ability to serve the market through its organization based on 11 specialized Sales Companies located in Europe and North America; however product availability and product application support is provided world-wide by the SKF international network.

The Linear Motion product range covers:

- High Efficiency Screws
- Linear Guiding Systems
- Electromechanical Actuators

CD-ROM "Designer"

All linear Motion products are available in this CD, in DWG and DXF files.

Thanks to "Designer", you can easily copy the drawing of the product you need into your own design drawing. If you are interested, please do not hesitate to contact your local SKF sales organization. It is free of charge.



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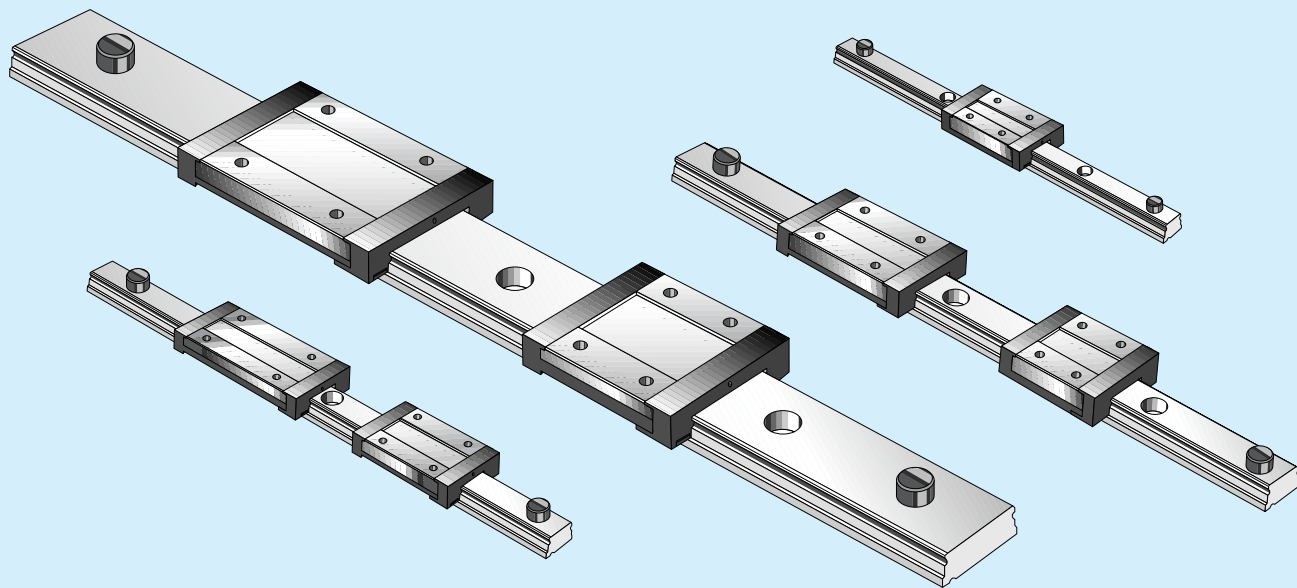
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The miniature profile rail guides complements the SKF Linear Motion Division product range.

These newly developed linear guides are designed above all for applications in precision mechanics, medical engineering, microassembly and the optics industry. Especially when the mounting space is limited, SKF miniature

profile rail guides are an excellent choice, as they have a high load carrying capacity combined with a compact design.

SKF Linear Motion offers these profile rail guides in four sizes (7, 9, 12 and 15 mm) and various slide options to cover most application requirements.



Features

Compact Design:

SKF miniature Profile Rail Guides have a simple structure contributing to the compactness and economical price. This small and lightweight product is very suitable for high speed Linear Motion up to 3 m/second.

Long Life:

Gothic arch grooves, at the raceway contacts, enable the slide to sustain loads and moments from any direction.

The raceway shape offers a large load capacity and a long life time due to the contact between the raceways and the balls.

Corrosion Resistant:

All parts of the system are made of stainless steel or plastic and provide superior corrosion resistance.

Easy to Maintain:

Oil holes in the end caps of the carriage make it easy to relubricate the system.

Technical features

All types are offered in stainless steel (X46Cr13, 1.3541).

The normal operating temperature for SKF Miniature Profile Rail Guide is from -20°C to $+80^{\circ}\text{C}$.

Under normal operation conditions the permissible speed is 3 m/s and the accelerations up to 80 m/s².

An oil hole for regreasing the system is in the endcaps.

Rail length

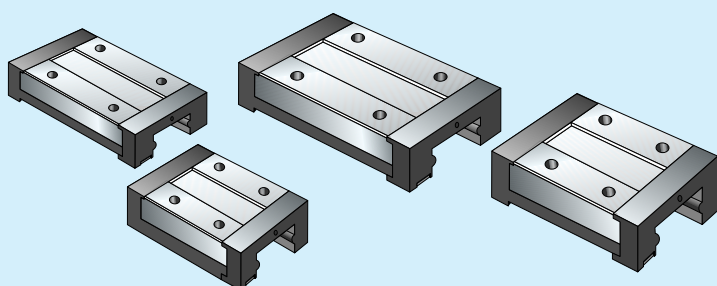
The maximum rail length in one piece for the different sizes is shown in the table beside.

Special Rail: SKF is able to deliver special rails like threaded mounting holes or additional pin holes on request. Drawing required.

Designation	Maximum length in one piece (mm)
LLMHR 7	300
LLMHR 9	500
LLMHR 12	700
LLMHR 15	900

Sizes of the carriages

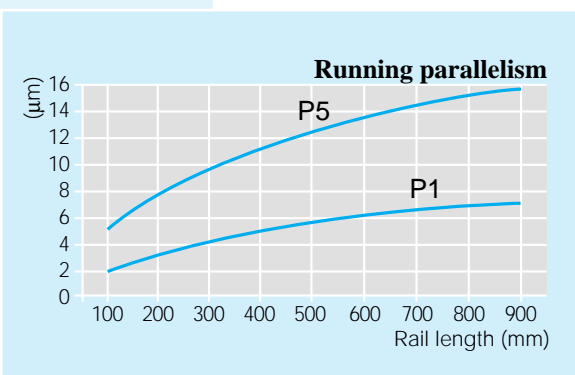
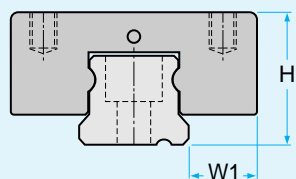
The carriages are offered in different designs. The long carriage is used for higher load carrying capacity. The wide carriage is used for higher moment stiffness and is usable as a one rail system. Also the wide carriage is available in a long version.



Accuracy

Miniature Profile Rail Guides are available in two accuracy classes.

Class of accuracy	P5 (mm)	P1 (mm)
Tolerance of height "H"	± 0.020	± 0.010
Difference in height "H" between paired guides	0.015	0.007
Tolerance of width "W1"	± 0.025	± 0.015
Difference in width "W1" between paired guides	0.020	0.010



Preloading and stiffness

For trouble free operation under different and widely varying operational conditions, it is necessary to determine the appropriate preload. We recommend systems free of clearance (T0) for applications with constant load and low friction. For applications with impact loads, vibrations, different load directions or moments we recommend light preload (T1).

Designation	Zero Clearance T0 (µm)	Light Preload T1 (µm)
LLM . C 7 TA	± 2	(0) - (-3)
LLM . C 7 LA		
LLM . C 9 TA	± 2	(0) - (-4)
LLM . C 9 LA		
LLM . C 12 TA	± 2	(0) - (-6)
LLM . C 12 LA		
LLM . C 15 TA	± 4	(0) - (-10)
LLM . C 15 LA		

Load Rating

Load rating and load direction

All SKF miniature profile rail guides have the same load ratings in vertical and lateral load direction due to the design of the system.

Basic dynamic load rating C

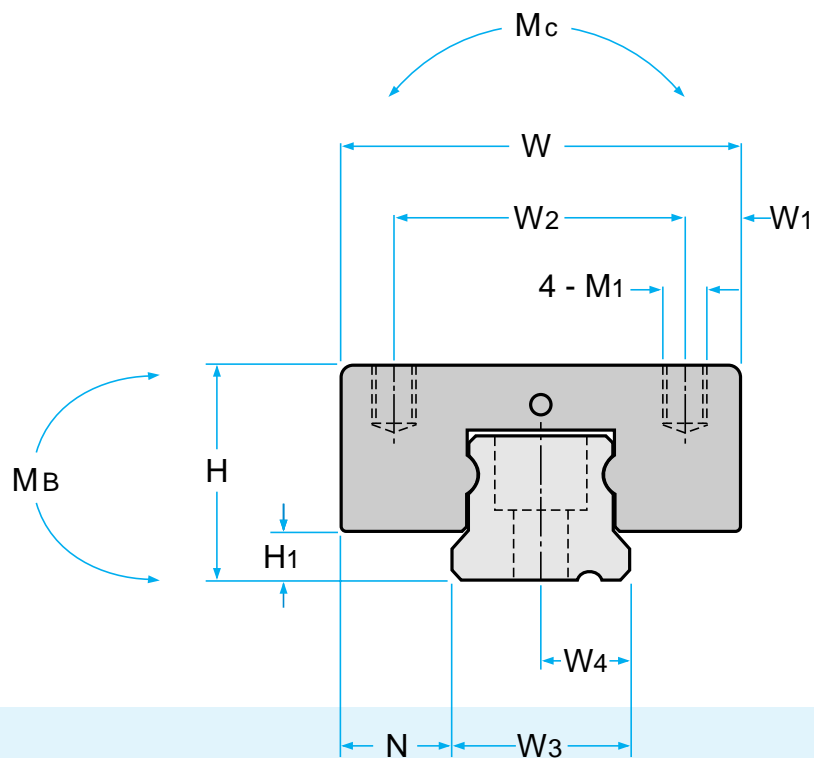
The basic dynamic load rating C is the constant load which a system can theoretically accept for a nominal life of 100,000 m of travel with 90% reliability.

Basic static load rating C_0

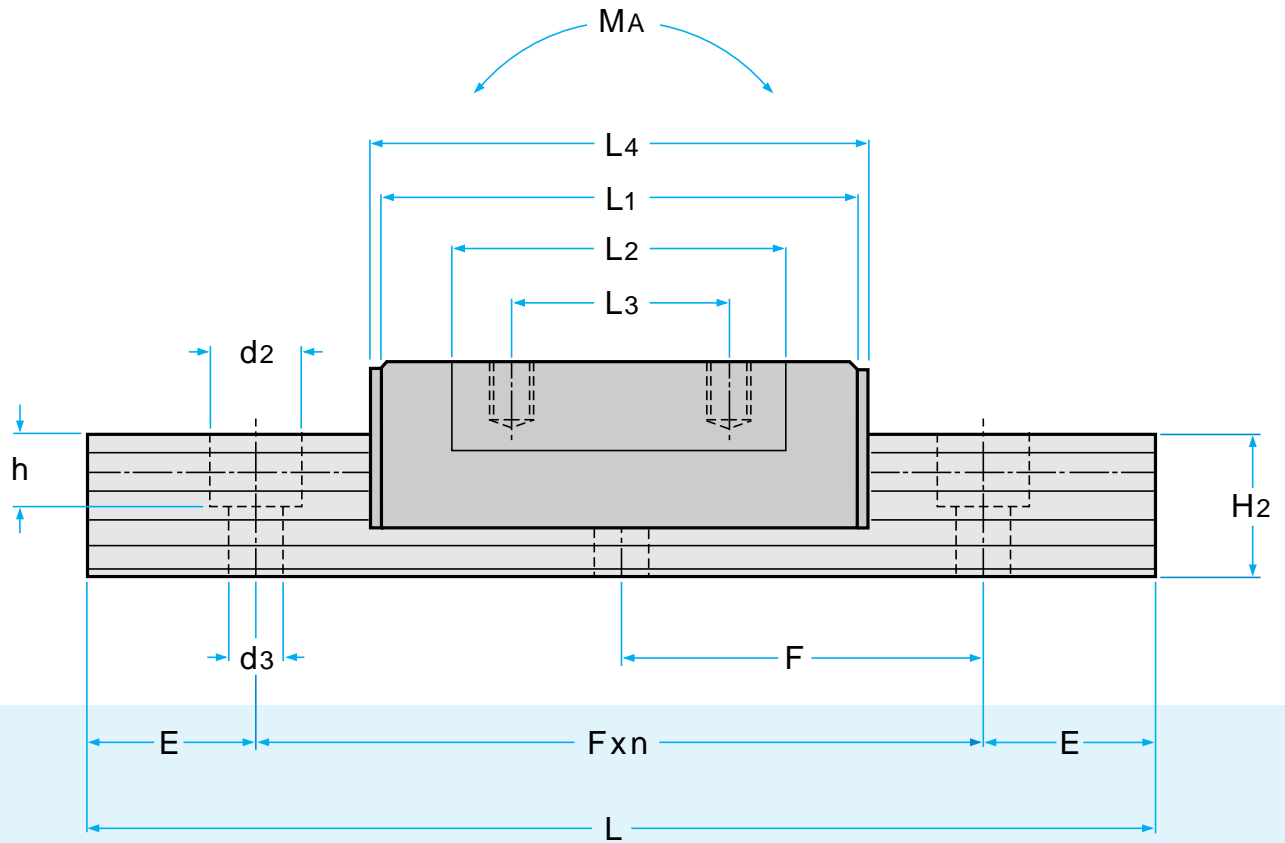
The static load rating C_0 is the load which corresponds to a calculated Hertzian Pressure between raceway and balls of 4,200 MPa. The resulting total permanent deformation of rolling elements and raceway represents approximately 0.0001 of the rolling element diameter.

Allowable static moment „ M_A , M_B , M_C “

The allowable static moment is the moment load that creates the same permanent deformation as the basic static load rating „ C_0 “.

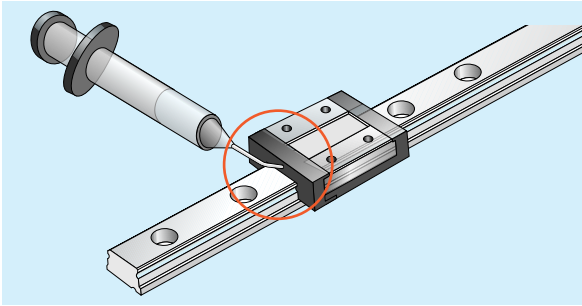


Designation	Carriage Dimensions										Weight (kg)
	H (mm)	W (mm)	W ₁ (mm)	W ₂ (mm)	L ₁ (mm)	L ₂ (mm)	L ₃ (mm)	L ₄ (mm)	M ₁ (mm)	H ₁ (mm)	
LLMHS 7 TA	8	17	2.5	12	22	16	8	23.5	M 2 x 2.5	1.5	0.01
LLMHS 9 TA LLMHS 9 LA	10	20	2.5	15	30 38.5	21.5 30	10 15	32 40.5	M 3 x 3	2	0.02 0.03
LLMWS 9 TA LLMWS 9 LA	12	30	4.5 3.5	21 23	36.5 48.5	28 40	12 24	38.5 50.5	M 3 x 3	2	0.04 0.06
LLMHS 12 TA LLMHS 12 LA	13	27	3.5	20	33 45	23 35	15 20	36 48	M 3 x 3.5	3	0.03 0.06
LLMWS 12 TA LLMWS 12 LA	14	40	6	28	42.5 56	32.5 46	15 28	45.5 59	M 3 x 3.5	3	0.08 0.11
LLMHS 15 TA LLMHS 15 LA	16	32	3.5	25	41.5 57.5	29.5 45.4	20 25	44.5 60.5	M 3 x 4	4	0.06 0.10
LLMWS 15 TA LLMWS 15 LA	16	60	3.5	45	54 71.5	42 59.5	20 35	57 74.5	M 4 x 4.5	4.5	0.15 0.22



Designation	Rail Dimensions						Basic Load Rating		Static Moments		
	H2 (mm)	W3 (mm)	W4 (mm)	d3 x d2 x h (mm)	F (mm)	Weight (kg)	C (N)	Co (N)	MA (Nm)	MB (Nm)	MC (Nm)
LLMHS 7 TA	4.8	7	3.5	2.5 x 4.5 x 2.5	15	0.19	860	1.670	4.9	4.9	5.2
LLMHS 9 TA LLMHS 9 LA	6.5	9	4.5	3.5 x 6 x 3.5	20	0.31	1.850 2.295	3.130 4.270	11.2 20.1	11.2 20.1	13.2 17.9
LLMWS 9 TA LLMWS 9 LA	7.5	18	9	3.5 x 6.0 x 4.5	30	0.96	1.785 2.640	3.330 4.900	14.2 30.2	14.2 30.2	30.4 45.1
LLMHS 12 TA LLMHS 12 LA	8.8	12	6	3.5 x 6 x 4.5	25	0.62	2.550 3.470	4.000 6.225	15 34.5	15 34.5	21.7 33.8
LLMWS 12 TA LLMWS 12 LA	8.8	24	12	4.5 x 8 x 4.5	40	1.40	3.300 4.150	5.780 8.000	30 55.8	30 55.8	69 95.6
LLMHS 15 TA LLMHS 15 LA	10.8	15	7.5	3.5 x 6 x 4.5	40	1.02	2.880 4.670	5.390 8.720	21.6 57.8	25.5 68.6	40.2 67.6
LLMWS 15 TA LLMWS 15 LA	10.8	42	9.5	4.5 x 8 x 4.5	40	2.95	3.890 5.830	7.060 10.600	40.2 94.1	48.0 108	148 225

Lubrication and Seals



SKF miniature profile rails are pregreased with lithium soap grease and can be used as delivered. Every carriage has a grease hole at the end caps where it is possible to regrease the systems with a grease syringe.

The relubrication time depends on the travelling distance and should be defined case by case in accordance with the machine and the environmental conditions.

Order designation for grease syringe:

Size 7, 9, 12: VM LLM 12

Size 15: VM LLM 15

Life calculation

$$L_{10} = \left(\frac{C}{P} \right)^3$$

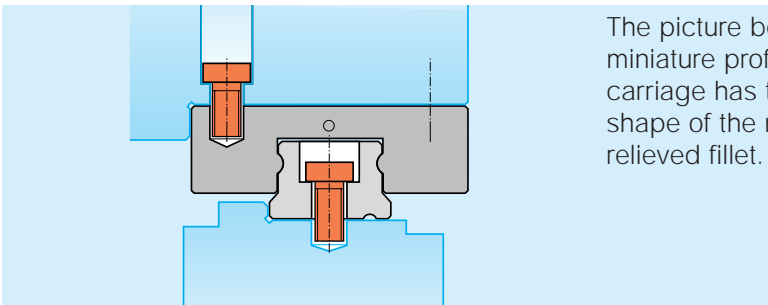
L_{10} = basic rating life, 10^5 m

C = dynamic load rating, N

P = equivalent dynamic bearing load, N

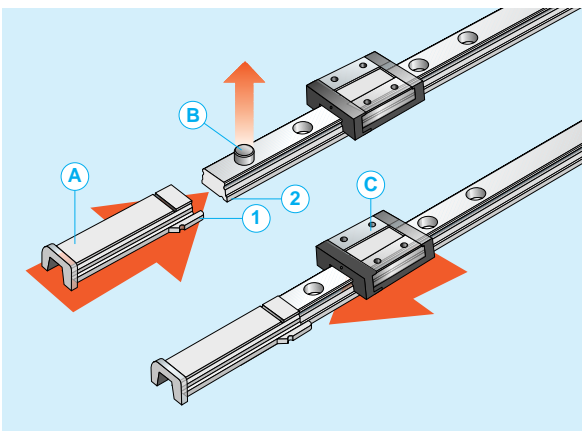
The life of a profile rail guide is defined as the distance travelled before the appearance of the first signs of material fatigue on the raceway or rolling elements. Our lifetime calculation is based on 100000 meters of travel. Many companies use only 50000 meters. In this case, please multiply the SKF dynamic load rating C by 1.26. For more details please refer to our Technical Handbook (Catalogue 4185 E).

Installation Method



The picture besides shows a typical mounting arrangement of miniature profile rail guides. The reference surfaces of rail and carriage has to be on the same side of the system. The corner shape of the mounting surface of the machine should have a relieved fillet.

Mounting Procedure



Remove the carriage from the rail:

1. Remove the endstop (B) from the rail. Move the plastic rail (A) to the end of the rail. Make sure, that the two rail alignment points (1) fit the rail (2).
2. Slide the carriage (C) slowly to the end of the rail. Be sure that the plastic rail (A) is as close as possible to the rail.
3. Hold the plastic rail (A) and move the carriage (C) very slowly on the plastic rail.

Move the carriage on the rail:

Follow the instruction above in reverse sequence.

If you mount or remount the Miniature Profile Rail Guide, it's always very important to use the delivered mounting rail! If you have lost this rail, please order it with the following designator:

XK-LLM (+ size).

Tightning torque

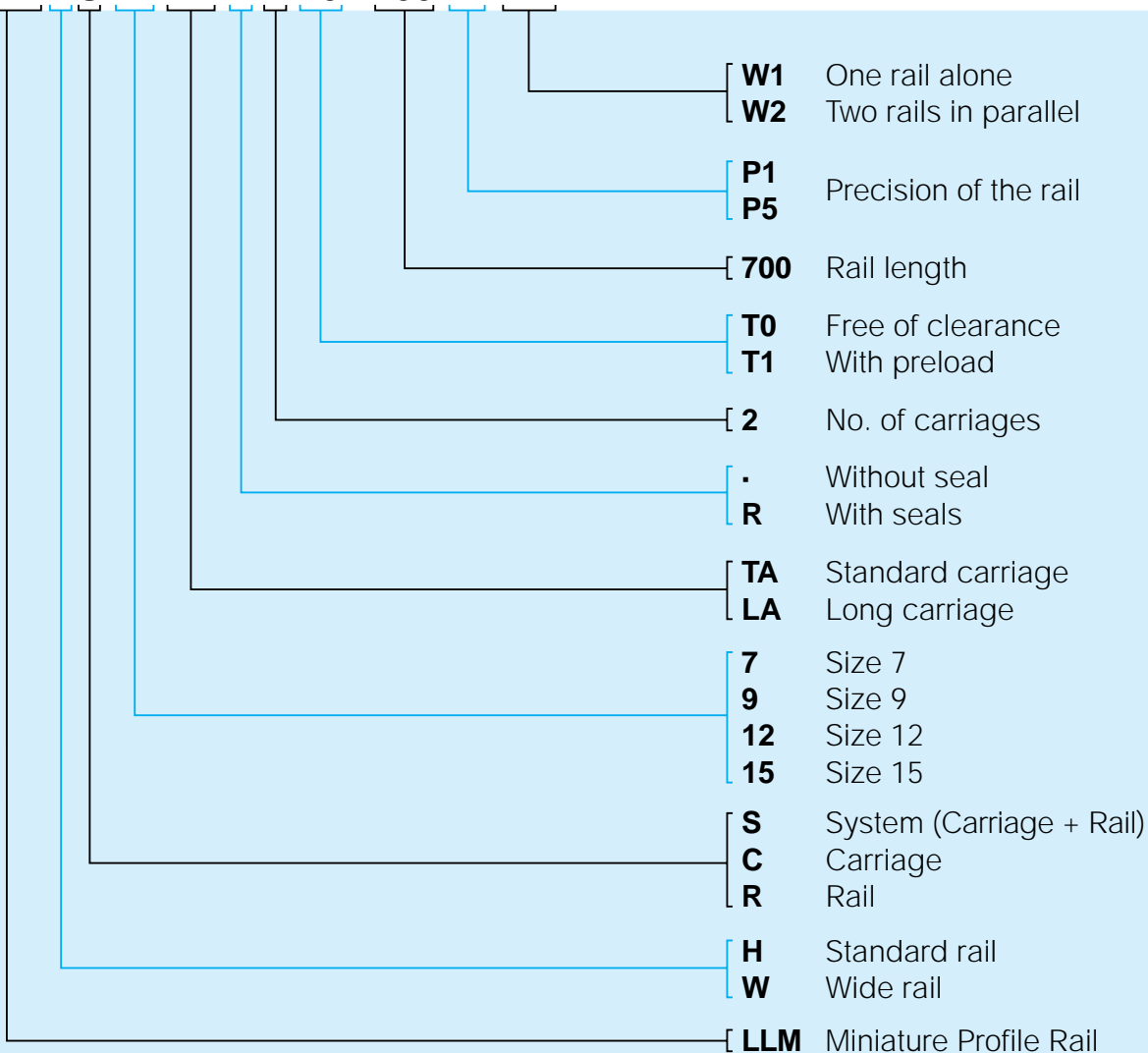
Bolt size	Maximum tightening torque (Ncm)
M 2	32
M 3	110
M 4	260
M 5	510

General values of maximum tightening torque of mounting bolts are shown besides.

Order designation

SKF Miniature Profile Rail Guides are manufactured in a variety of types and sizes to suit particular applications. When ordering please specify requirements in accordance with the following chart.

LLMHS 12 TA R 2 T0 - 700 P1 W2

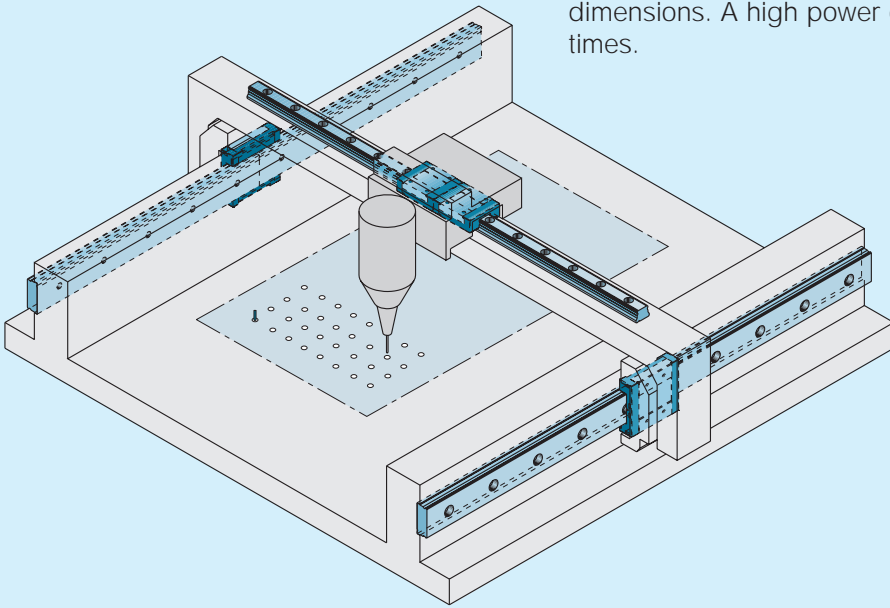


Applications

Electronics

PCB Drilling and Routing Machine

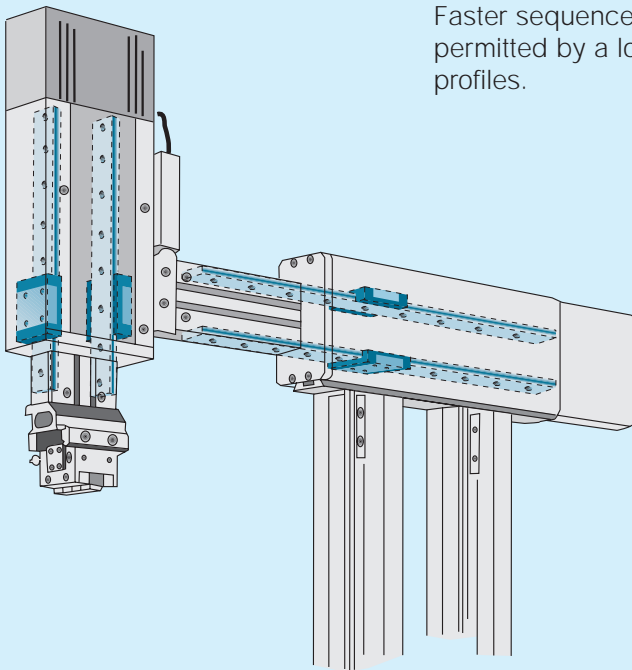
A flat and weight-saving design enables a machine with small dimensions. A high power density results in shorter processing times.



Automation

Pick-and-Place Manipulators

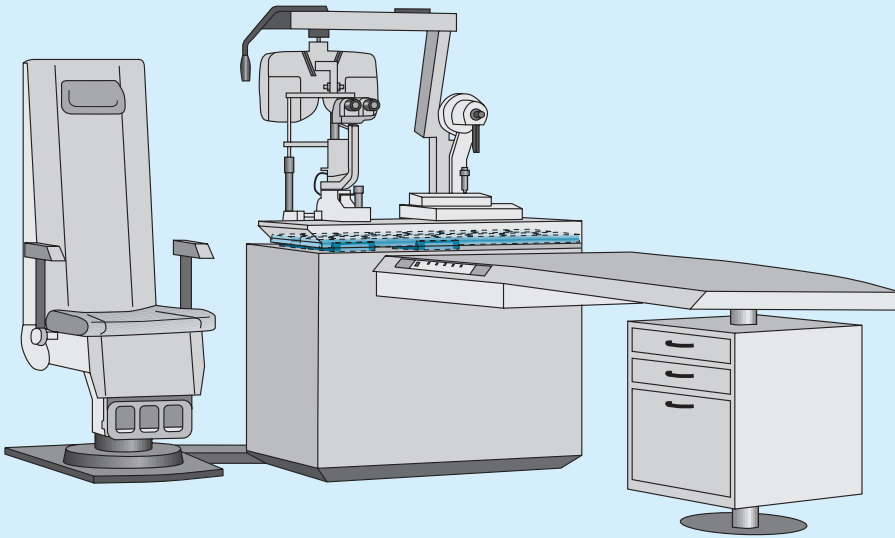
Faster sequences of movement and higher cycle rates are permitted by a low-mass guide system coupled with aluminium profiles.



Medial Equipment

Optical instruments

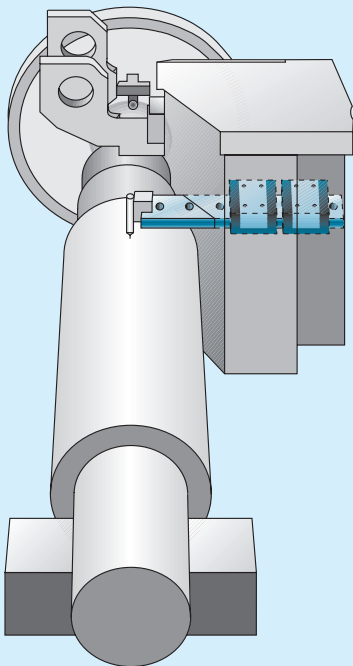
Ease of movement and rustproof materials guarantee reliability in all-round daily use.



Precision Mechanics

Measuring Systems

Accuracy in minimum space increases the capacity and the capabilities of measuring machines.



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SKF Guiding Systems



SKF Ball & Roller Screws



SKF Actuators

SKF Linear Motion offers a wide range of precision engineered linear motion components, units and systems. In addition to comprehensive product literature and software, SKF offers assistance from experienced linear motion engineers.

Linear Motion has **3 product lines** and a sales organisation based on **11 specialized sales companies** located in Europe and in the USA.

However the product availability as well as the product application is **world-wide granted by the SKF Bearing international network**. To get any other SKF address all over the world, please contact one of the companies below.

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<http://www.linearmotion.skf.com>

